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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-1849J
Plant ID No.:	107-00001
Applicant:	E.I. duPont deNemours and Company
Facility Name:	Washington Works
Location:	Washington, Wood County
NAICS Code:	2821
Application Type:	Modification
Received Date:	August 4, 2011
Engineer Assigned:	Laura Jennings
Fee Amount:	$1,000.00
Date Received:	August 17, 2011
Complete Date:	September 20, 2011
Due Date:	November 19, 2011
Applicant Ad Date:	August 5, 2011
Newspaper:	*The Parkersburg News*
UTM's:	Easting: 442.25 km Northing: 4346.8 km Zone: 17
Description:	Re-routing of the discharge emissions from the maintenance preparation jets associated with the polymer capping units in the Acetal Resin facility. During periods of maintenance activity on the capper units there are emissions associated with the emptying and degassing of the vessel contents. This proposed change provides a means of routing the emissions after the maintenance jet to the scrubber [DEM-OH] to control emission to the atmosphere and provide better flexibility of operation.

DESCRIPTION OF PROCESS

An aqueous formaldehyde solution is received and blended with a recycle stream from internal to the process. The composite aqueous solution goes through several processing steps to allow the isolation of a pure formaldehyde vapor stream that is then used in a polymerization step to generate a raw polymer. This raw polymer is then introduced to a capping unit that reacts with the raw polymer with a stabilization agent that "caps" the

polymer chains created in the polymerization to better stabilize the polymer. The stabilization reaction is done in one or the other of the two available capping units (DPH or DPL). The completed capped polymer goes to the next step of the process for finishing and packaging.

Normal operating emissions from these two capping units (DPH or DPL) are sent through raw material recovery and then to either the Comparable Fuels Boiler [DOMC] or to the flare [HZZC] for thermal treatment of residual materials.

From time to time, the capping units (DPH and DPL) must be opened up for maintenance purposes. The normal practice is to de-inventory the vessels while routed to the waste gas header. However, residual amounts of raw material cannot be completely purged through the raw material recovery system to the waste gas header. When the cappers are being shutdown for maintenance, the final purging as well as the continued purge will happen when the units are opened to the atmosphere. The opening to the atmosphere would allow oxygen into the waste off gas header and could cause a problem with explosive mixtures in the waste off gas header.

Currently, during times of maintenance, the vapor space of the cappers are drawn out by a steam vacuum jet and vented through a maintenance jet scrubber [GZZC]. The maintenance jets act as a scrubber because the steam jet leg is flooded with water to fully condense the steam and capture the majority of the soluble emissions.

During operation, when emissions are being fed to it, the scrubber is required to have a flow rate between 2-10 gallons per minute. There is no flow monitor associated with this and the flow is verified by viewing the condition of the flow in the field. It is determined to have sufficient water present if all the steam is being condensed and the tail pipe of the jet is warm to the touch.

To improve maintenance operations, Delrin® plans to increase the jet capacity for each capping unit and re-route the offgas to the current emergency vent scrubber [DEM-OH]. Instead of having one maintenance steam jet [GZZ], each capper will have a steam jet [GZZ1 and GZZ2]. Since each capper has a steam jet, Delrin® will have the ability to route both capping units to the DEME emission point through the DEM-OH scrubber. This change will allow a more rapid final de-inventory of the capping unit scheduled for maintenance as well as improved control of emission from the capper maintenance jet. The emergency vent scrubber [DEM-OH] will be used for both emergency diversion services as well as controlling emissions from the maintenance activities on the capping units. Since the emergency vent scrubber [DEM-OH] is currently only used for emergency events to minimize the potential for occupational health exposures to potential chemicals it does not have an emission limit or minimum scrubber efficiency in the permit.

The permit application deals with the preparation of the capping units for maintenance activities. This preparation involves the emptying and purging of the reaction vessels prior to the actual maintenance works as well as the use of the maintenance jet to maintain a purge through the capping unit under maintenance to prevent oxygen and moisture intrusion into the vessel.

The emission sources identified as GZZ1 and GZZ2 do not contain operational emissions. They contain only emissions associated with the preparation and accomplishment of maintenance activities on the respective cappers. The system will be independent of the waste gas header system and will be piped separately to the DEM-OH scrubber. This scrubber is being used as a replacement for a steam jet squelch pot (GZZC) which was tested during the implementation of the 45 CSR 21 consent order to ensure compliance with 45 CSR 21 control level requirements.

Control Device:

GZZ1 and GZZ2 are directly connected to DEM-OH by a pipe designed for 700 ACFM flow. In this line, there will be both the steam from the jet and the organic component. As the steam cools, water will condense and assist in removal of the soluble organic phase. The steam jet(s) provide the force to move the stream to the packed bed scrubber.

The guaranteed minimum collection efficiency of VOC's is 93.49% and the guaranteed minimum collection efficiency of Formaldehyde is 97.75%. The supply liquor is the site process water and will not be recycled.

The solubilities as provided in the material safety data sheets are listed below:

Acetic Acid	Infinitely soluble
Acetic Anhydride	Complete @ 20°C (reacts rapidly wiht water forming acetic acid)
Formaldehyde	Infinitely soluble
Heptane	Insoluble in water
Hexane	Insoluble in water
MDA	Not provided.
Toluene	Very slightly soluble in cold water

Emission Units Table:

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed / Modified	Control Device
GZZ1	DEME	Maintenance Jet for #1 Capper (DPH)	2011	DEM-OH
GZZ2	DEME	Maintenance Jet for #2 Capper (DPL)	2011	DEM-OH

SITE INSPECTION

DuPont Washington Works facility is well known by the DAQ. The writer has previously had a site visit of the Acetal Resins unit within the facility. The last full targeted on site inspection was conducted September 2, 2009 by James Robertson on the Compliance and Enforcement section of the DAQ. The facility was found to be in compliance. The next full on site inspection is scheduled to be completed by September, 2012.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The maintenance jet scrubber [DEMC] is used when the process feed is stopped. The emissions come from evacuating the vapor space of the capper. It is assumed that all the emissions come off in the first hour of turning the maintenance jet on. Therefore, all the emissions are accounted for in the initial hour of operation. The maintenance jet is however left on to remove any residual vapors. The potential for oxygen inclusion into the gas stream during maintenance precludes the use of the waste gas header and thermal destruction of the emissions.

The annual limits presented in Emissions Table 1.0 are based on 45 evacuations of the cappers annually. The writer has verified the emissions calculations provided in the Emissions Table 1.0. It should be noted that the annual emissions limit will be less than what is provided in the table below. To maintain compliance with Consent Order CO-R-21-97-47, the annual emissions limit will be based on 36 maintenance events per year between GZZ1 and GZZ2 to meet the 36 maintenance hours limited by the CO. The Change in Emissions Table 2.0 will reflect the permit limits and not the annual maximum potential controlled emissions presented in Emissions Table 1.0.

Emissions Table 1.0:

Emission Point	**Emission Unit**	**Control Device**	**Regulated Pollutant**	**Maximum Potential Uncontrolled Emissions**		**Maximum Potential Controlled Emissions**	
ID #	**ID #**	**ID #**		**lb/hr**	**tpy***	**lb/hr**	**tpy***
DEME	GZZ1 GZZ2	DEM-OH	Formaldehyde	58.22	1.31	1.31	0.03
			Acetic Anhydride	366.97	8.26	0.37	0.09
			Acetic Acid	13.23	0.30	0.02	0.01
			MDA	22.31	0.51	0.03	0.01
			Heptane	28.13	0.64	28.13	0.64
			Hexane	1.52	0.04	1.52	0.04
			Toluene	0.61	0.02	0.61	0.02
			Total VOCs	490.98	11.05	31.96	0.72
			Total HAP	60.34	1.36	3.43	0.08

* DuPont annual emissions are based on 45 evacuations of the cappers annually.

Based on information provided in the regulatory section of the permit application, the current permitted emissions were calculated on the basis of only having the capability of conducting maintenance on one capper at a time. The calculations for the proposed emissions include the capability of conducted maintenance on both cappers at the same

time.

Change in Emissions Table 2.0:

Emission Point ID	Emission Unit ID	Control Device ID	Regulated Pollutant	Permit R13-1849I limits		Proposed Increase in Emissions	
				lb/hr	tpy	lb/hr	tpy
From: GZZE To: DEME	From: GZZ To: GZZ1 GZZ2	From: GZZC To: DEM-OH	Formaldehyde	1.31	0.03	1.23	0.02
			Hexane	1.52	0.03	1.51	0.02
			Toluene	0.61	0.01	0.60	0
			Total VOCs	31.96	0.58	18.56	0.28
			Total HAP	3.43	0.07	3.35	0.06

REGULATORY APPLICABILITY

STATE REGULATIONS:

45CSR13 PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

This permit application meets the definition of a modification per 45CSR13-2.17b permit because the increase in potential emissions is greater than 2 lb/hr of aggregated hazardous air pollutants. DuPont has met the requirements of 45CSR13 by submitting a complete permit application, paid the applicable permit fees, and published the legal notice in the Parkersburg News on August 5, 2011.

DuPont has a site wide permit (R13-2617E) that includes the site wide requirements from the Rule 21 and Rule 27 Consent Orders. The requirements of R13-2617 were reviewed as they relate to this permit application. The maintenance vacuum jet GZZ is not subject to 4.1.2.1 because the source was not identified in Attachment A of the original RACM plan. Emission point GZZ was identified in Attachment B of the original RACM plan for routine/normal operating and maintenance scenarios resulting in excess emissions. DuPont demonstrated compliance with requirement 4.1.2.2 by submitting a RACT analysis. A permit application is required to be submitted for permit R13-2617E to

updated the emission point and emission units in Attachment A associated with the capper jet maintenance.

45CSR21 REGULATION TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF VOLATILE ORGANIC COMPOUNDS

DuPont Washington Works has a site wide permit, R13-2617E, that contains the applicable requirements from 45CSR21 and Consent Order CO-R21-97-47 that apply to the Acetal Resins unit.

DuPont demonstrates compliance with Section III, Requirement 3 of CO - R21-97-47 because the hourly emissions rate provided in the emissions section of the evaluation are less than 132.2 lb/hr for emission point GZZ as limited in Attachment B of the CO. Section III, Requirement 3 states that the COMPANY shall comply with the operation and VOC emissions outlined in Attachment B during routine maintenance activities. Attachment B provides a maximum of 36 hours/year for routine capper jet maintenance from emission point GZZ. DuPont will demonstrate compliance with the annual limits by demonstrating compliance with the permit requirements of R13-1849J for the re-routed emissions from DEME.

The potential emission rate associated with the proposed change is above 6 pounds per hour and is constructed, modified, or begins operating after the effective date of 45CSR21; therefore, the facility must comply with a control plan developed on a case-by-case basis approved by the Director that meets the definition of reasonably available control technology (RACT) in section 2.60 for both fugitive and non-fugitive emission sources per 45CSR21-40.3.c and permit R13-2617 section 4.1.2.2.a.

The MTE and associated emission reductions of the constructed or modified source will not be calculated into the site-wide aggregate hourly and annual emissions reduction requirements set forth in section 4.1.2.1 of permit R13-2617. [R13-2617 Section 4.1.2.2.b.]

“Reasonably Available Control Technology” (also denoted as RACT) means the lowest emission limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.

DuPont submitted the required RACT analysis for the emission point DEME to evaluate if further controls for VOC emissions are reasonably available and practical for the use in this application. Three options were reviewed; a chilled condenser installed after the water scrubber, an oil scrubber with regeneration capabilities for the oil installed after the water scrubber and a carbon bed installed after the water scrubber. Cost evaluation was supplied for the first two options. The third option could not

be supported due to operational volume requirements on the water scrubber discharge when streams other than the capper maintenance jet stream are routed to the DEM scrubber.

RACT Analysis for Acetal Resin modification of the capper maintenance jet scrubber redirection from GZZC to DEMC:

The Acetal Resin manufacturing area reviewed the following potential control technologies for this application: (1) work practices potentially useful for reducing organic emissions; (2) incorporation of the capper maintenance jet discharge into the waste gas header system; (3) installation of a carbon filter bed after a water scrubber to control insoluble organic emissions; (4) installation of a condenser after the water scrubber to condense insoluble organic emissions; and (5) installation of an oil scrubber with regeneration capability to control insoluble organic emissions. While a further detailed analysis was conducted, DuPont determined that the first three potential control technologies failed either due to the potential for oxygen inclusion in the vent stream or the inability to consistently apply the practice or technology to the source or emission stream.

The remaining two options were evaluated using a “total annual cost” basis to develop an annual cost per ton of VOC controlled. The capital cost as developed were venture guidance estimate (VGA) quality capital cost estimates with the appropriate factor applied to develop the potential range of costs for the project. The lowest boundary for cost was used for the application of the cost recovery factor that enters into the annual cost calculation. DuPont used the current corporate recommended cost recovery factor of 12% for these estimates. Nominal manpower and utility costs were also used.

Option	Cost ($/ton controlled)
Condenser following Scrubber (DEMC)	$968,636.00
Oil Scrubber following Scrubber (DEMC)	$586,525.00

Based on the significantly high cost per annual ton recovered, DuPont feels the proposed installation and operation of the DEMC as the capper maintenance jet scrubber represents RACT for this installation.

The writer has reviewed the RACT analysis information provided by DuPont and agrees with the conclusion that the capper maintenance jet scrubber [DEMC] represent RACT for the maintenance activities associated with this permit modification.

45CSR27 TO PREVENT AND CONTROL THE EMISSIONS OF TOXIC AIR POLLUTANTS

The site wide permit R13-2617E that includes the 45CSR21 and 45CSR27 requirements for DuPont's Washington Works site indicates that the maintenance vacuum jet (currently controlled by GZZC and vented through GZZE) is not subject to Rule 27, as documented in Attachment A of said permit. The vents associated with the capper jet maintenance GZZ1 and GZZ2 (controlled by DEM-OH and vented through DEME) will replace the capper jet maintenance vent GZZ.

The annual permit emissions limit for Formaldehyde through DEME will be 0.024 tpy, or 47.16 pounds per year.

45CSR30 REQUIREMENTS FOR OPERATING PERMITS

DuPont Washington Works has submitted a minor modification application to their Title V permit R30-10700001-2003 (Part 3 of 14) along with the application for the NSR permit R13-1849J.

FEDERAL REGULATIONS:

40 CFR 63 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES

Subpart YY NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES: GENERIC MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY STANDARDS

The operation of the capping units within the Acetal Resin Manufacturing facility is covered by the Acetal Resin MACT requirements. Operation of those units under normal operational modes is covered by the Acetal MACT rules. Preparation of the facilities, and specifically the individual capping units for maintenance operations are handled as part of the Startup, Shutdown and Malfunction (SSM) plan for the Acetal Manufacturing facilities. Maintenance wastewater, generated by the scrubber being used for the preparation of the capping units for maintenance, is covered as part of Maintenance Wastewater Plan included in the SSM plan.

Subpart FFFF NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS: MISCELLANEOUS ORGANIC CHEMICAL MANUFACTURING

The permittee is not subject to the MON MACT because of the exclusion

defined in 40 CFR 63.2435(b)(3) that is invoked when another MACT standard is applicable. The capping units are covered by the Acetal Resin MACT (40 CFR 63, Subpart YY) and the operation of the maintenance jet scrubber is covered by the required SSM plan for the operation of the jet and by the maintenance wastewater plan for the wastewater generated by the scrubber.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There are no new air pollutants as a result of this permit application.

AIR QUALITY IMPACT ANALYSIS

This DuPont Washington Works application for an alternative operating scenario does not meet the definition of a major modification to an existing major stationary source according to 45CSR14 and therefore, no air modeling is required.

MONITORING OF OPERATIONS

- Measure the scrubber liquor flow rate when the unit maintenance jet scrubber [DEME-OH] is in operation.
- Records will be maintained for the number of evacuations of the maintenance cappers on an annual basis, not to exceed 36 per CO-R21-97-47.

CHANGES TO PERMIT R13-1849I

- Updated emission unit table 1.0 to reflect both maintenance vents GZZ1 and GZZ2 for each of the cappers (previously GZZ), change in the emission point from GZZE to DEME, and changed the control device from GZZC to DEM-OH.
- Updated the emissions table in section 4.1.1 as follows:

Emission Point	Pollutant	Emission Limit			
		pph R13-1849I	pph R13-1849J	tpy R13-1849I	tpy 1849J
~~GZZE~~ DEME	VOC	13.4	31.96	0.3	0.58
	Formaldehyde	0.08	1.31	0.01	0.03
	Hexane	0.01	1.52	0.01	0.03
	Toluene	0.01	0.61	0.01	0.01
	THAP	0.08	3.43	0.01	0.07

- Added 4.1.15 requirement not to exceed 36 capper maintenance events annually
- Added record keeping requirement 4.4.23 to demonstrate compliance with 4.1.15.
- Updated Appendix A (Parametric Monitoring as follows:

FROM:						
Equipment ID	**Emission Point**	**Description**	**Monitoring Parameter**	**Parameter Value**	**Data Collection Frequency**	**Data Averaging Period**
GZZC	GZZE	Capper Maintenance Jet Scrubber	Scrubber Liquid Flow	2 to 10 gpm	**No flow monitor exists** Field verify that water valve is on and discharge from scrubber before initiating operation of equipment	
TO:						
DEM-OH	DEME	Emergency Wet Scrubber	Scrubber Liquid Flow	≤ 50 gpm	Continuous when the unit is in operation	1-hour

CHANGES THAT NEED TO BE MADE TO UPDATE PERMIT R13-2617E:

Permit R13-2617E is the site wide permit that consolidates the Rule 21 and Rule 27 requirements from the original consent orders for each rule. Attachment A is the 45CSR21 and 45CSR27 source list for the site.

The permittee has the responsibility to update Attachment A of permit R13-2617E to reflect the changes in this permit R13-1849J. Changes include the emission point ID from GZZE to DEME, Source ID(s) from GZZ to GZZ1 and GZZ2, and the Control Device ID in Appendix A. These changes must be submitted in a new permit application.

RECOMMENDATION TO DIRECTOR

The applicant meets all applicable federal and state regulations associated with the proposed change that is the subject of this permit application based on the information provided in the permit application along with the supplemental information received from the applicant. It is therefore the recommendation of the writer that permit R13-1849J be granted to DuPont, Washington Works Facility located in Wood County, WV.

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Laura M. Jennings Date
Permit Engineer